635 TRAFFIC SIGNAL DESIGN AND DRAFTING GUIDE

This guide describes typical practices for new or modified Traffic Control System installations statewide. This guide is a supplement to ADOT's Traffic Signal Standard Drawings, Standard Specifications, Special Provisions, MUTCD and other current design policies. Deviations will be allowed based on informed engineering decisions.

1. **Cell Libraries**
   a. To attach ADOT Traffic Electrical Cell Library, select *Element, Cells, s:\standards\english\adot.cel* or *s:\standards\english\osheet.cel*. See CADD Standards, Traffic Operations, Graphics, Volume 4 sheets 1-94 for graphic representation of adot.cel and sheets 95-111 for osheet.cel.
   b. For the pole and conductor schedules, attach osheet.cel, use cells NEWPOL and NEWCON.
   c. A more direct method is type **mdl l trafo** to get the Traffic Electrical Design Menu.
   d. For metric cell library, select *s:\standards\metric\tred.cel.*

1. **Scale**
   a. The scale for Traffic Signal plans will be 1" = 20'.
   b. The scale for Lighting plans will be 1" = 100'.

2. **Notes & Symbols**
   a. There should only be one set of General Notes or special symbols applicable to the entire project on one sheet of the Electrical plans. Abbreviations, and symbols shown on the Traffic Signal Standard Drawings or Standard Specifications shall not be redefined on a project.

3. **Existing Signals & Lighting**
   a. Where existing signals are to be modified/revamped, it is desirable that the construction plans include a separate plan of the existing "As-Built" system as well as a plan showing modifications. When the existing and proposed systems cannot be placed on the same sheet, a separate sheet should be used. All utilities shall be shown on the signal plans. Crosswalks, lane designations, and left turn bays shall be shown on the plans, but not dimensioned.

4. **Researching**
   a. Research files at Engineering Records or Traffic Engineering to determine the latest project at the intersection. Research for right-of-way and utilities.
   b. Traffic Electrical has an "As-Built" file located in room 951 of the building. The plans are in Route/milepost sequence. **DO NOT** keep vellums/originals. Make a copy and immediately return the original to the file.
   c. Reference (and copy) or draw up geometrics. Draw geometrics to a minimum of 500' to each side of the intersection.

5. **Preliminary Pole Layout**
   a. Place underground conduit and pullboxes. All street crossing pullboxes shall be number 7, with the exception of the pullbox on the corner where the control cabinet

will be. This pullbox shall be a number 7 with an extension. Conduit runs to advance loop detectors or advance flashers shall be number 5 pullboxes.

b. Place Signal poles.

6. **On-Site Field Inspection**

a. The designer/drafter shall collect all data required to develop a base drawing of existing conditions which can be used for the design process. The On-Site Field Inspection Checklist (see Section 636) includes data to be considered. The information gathered should not be limited to items found on the list. Conditions may warrant additional data.

7. **Pole Locations**

a. Poles being placed in areas where there is curb, gutter, and sidewalk should be installed behind the sidewalk. As a general rule, four poles will be installed at an intersection, unless there are circumstances (i.e. overhead power lines, underground utility conflicts) that require moving poles. When using four poles, they should be placed in proximity to the wheelchair ramps. Six or eight pole intersections shall be used when the radius require signal mast arms longer than 55'. When the aforementioned happens, the mast arm pole should be moved to the end of the radius and a Type A pole placed at the wheelchair ramp.

8. **Signal Faces**

a. All signal faces shall be 12".
b. All signal faces shall have louvered backplates.
c. Mast arm signal faces shall be placed with one (outboard) a minimum of 3 feet inside the left turn lane stripe. The second mast arm signal face shall be centered in the through lane. A third signal face shall be placed on the far left.
d. Pedestrian signal faces are placed where there is minimum visibility interference from vehicles stopped at the intersection.
e. All signal faces shall be LED modules.

9. **Conduits & Labels**

a. All street crossing conduits shall be 3" PVC.
b. All pullbox to pole conduits shall be 3" PVC. (**exception:** When using a Type A pole, use 2" PVC.)
c. All loop detector stub-outs and advance loop detector and advance flasher runs shall be 2" PVC.
d. Poles are labeled with letters, starting at the Control Cabinet with "A" in a hexagon (cell) and then proceed in a clockwise direction with pole lettering.
e. Conduits are labeled with numbers in a circle (cell) beginning with "1" as the service run, runs 2 and 3 are the two conduits between the Control Cabinet and the number 7 pullbox with an extension and then, in a clockwise direction from the Control Cabinet, number street crossings, then pole runs, then loop detector stub-outs or runs.

10. **Loop Detectors**

a. Use 6'x50' quadruple loop detectors for left turn loops on mainline and for minor street loops.
b. For speed limits 40 mph and above, use 6'x6' advance loop detectors for the mainline thru movement.

11. **Pole & Conductor Schedules**
    a. The pole schedule tells the contractor what type of mounting assemblies, signal faces, pedestrian faces, push buttons, poles, and mast arms to use. The pole schedule also tells the contractor where the poles are located and where the mounting assemblies are to be placed on the pole. Incorporated into the pole schedule is the type of cabinet and controller to be used along with the type of luminaire.
    b. For pole schedule, Use Traffic Electrical Design Menu "trafo" to build poles.
    c. The conductor schedule tells the contractor what phase the wires are and how many. All Traffic Signals shall be wired for full 8-phase operation with "future" phases labeled appropriately.

12. **General Notes**
    a. Reference generic notes from s:\td100\notes.dgn and edit and add as necessary.

13. **Special Provisions**
    a. The former Traffic Electrical Design Section has accumulated a number of Special Provisions which have been used to address a number of special items or conditions such as :
        - interconnect communications cable
        - temporary signals
        - ADA pedestrian push buttons
        - pre-formed loop detectors
        - pullboxes
        - department furnished/loaned materials
        - sign lighting
        - Emergency Vehicle Preemption (EVP)

    The Special Provisions which are available vary considerably with respect to quality; therefore, a complete listing and access to these Special Provisions are not included here. Electronic copies of these Special Provisions are available. Copies of Special Provisions for the areas listed above are also available upon request. Contact anyone in the former Electrical Design Section.

    b. Contracts and Specifications also maintains a set of Stored Specifications for use on signal projects. The stored specs for signal projects include:
        731STRSP - 731-2.02 Structural Supports, Anchor Bolts.
        733SGNL - 733-2.01(A) Traffic Signal Glass Lenses
        734PATSC - 734-2.01(C) Pre-Approved Controllers